Identifier: LANL-ER-SOP-06.01	Revision: 3	Effective Date: 03/05/02
ER Document Catalog Number: **ER2002-0074**		
Author: Shannon Purdue		

ENVIRONMENTAL RESTORATION PROJECT

A Department of Energy Environmental Cleanup Program

Environmental Restoration Project
Standard Operating Procedure

for:

Purging and Sampling Methods for Single Completion Wells

Los Alamos
NATIONAL LABORATORY
Los Alamos, New Mexico 87545

Revision Log

Revision No.	*Effective Date*	*Prepared By*	*Description of Changes*	*Affected Pages*
0	03/16/92	S. Wagner	New Procedure	All
1	03/08/99	Jennifer Pope	Technical revisions	All
2	04/27/01	Jennifer Kofoed	Technical changes; modified for new ER format	All
3	03/05/02	Shannon Purdue	Technical revisions; Revised to provide additional requirements for filtering samples.	All

Purging and Sampling Methods for Single Completion Wells

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Purging and Sampling Methods for Single Completion Wells

1.0 PURPOSE

This Standard Operating Procedure (SOP) describes methods used on the Los Alamos National Laboratory (LANL) Environmental Restoration Project (ER) for evacuating stagnant water from a well bore in sufficient quantities so that the water samples that are collected afterwards are representative of the formation interval open to the well bore.

2.0 SCOPE

2.1 This SOP is a mandatory document and shall be implemented by all ER Project participants when performing purging and sampling of single completion wells for the Environmental Restoration (ER) Project.

2.2 Subcontractors performing work under the ER Project's quality program may follow this SOP for purging and sampling of single completion wells. Subcontractors may use their own procedures provided the substitute meets the requirements prescribed by the ER Project Quality Management Plan, and has been approved by the ER Project's Quality Program Project Leader (QPPL) before beginning the activities.

3.0 TRAINING

3.1 ER Project personnel using this SOP are trained by reading the procedure, and the training is documented at ______________________________ in accordance with LANL-ER-QP-2.2.

3.2 The **Field Team Leader** (**FTL**) shall monitor the proper implementation of this procedure and ensures that relevant team members have completed all applicable training assignments in accordance with LANL-ER-QP-2.2.

4.0 DEFINITIONS

4.1 *Hydrogen-ion activity (pH)* — The effective negative log base 10 of hydrogen ion [H^+] activity. A measure of how acidic or a basic solution is (numerically equal to 7 for neutral solutions and increasingly basic above and acidic below that value).

4.2 *Redox potential (Eh in mV)* — Chemical reactions whereby a participating element changes its oxidation state by losing or gaining valence electrons.

This may be referred to as oxidation-reduction potential (ORP), which is corrected to Eh.

4.3 *Single completion well* — A well constructed with a single well screen across a zone of groundwater saturation.

4.4 *Site-Specific Health and Safety Plan (SSHASP)* — A health and safety plan that is specific to a site or ER-related field activity that has been approved by an ER health and safety representative. This document contains information specific to the project including scope of work, relevant history, descriptions of hazards by activity associated with the project site(s), and techniques for exposure mitigation (e.g., personal protective equipment [PPE]) and hazard mitigation.

4.5 *Conductance, or conductivity* — A measure of the ease with which an electrical current flows through a substance under the influence of an applied electrical field. It is dependent upon the presence of dissolved ions (total and relative concentrations, valence, and mobility) and temperature. It is the reciprocal (inverse) of resistivity.

4.6 *Specific conductance* — Defined as the electrical conductance that would occur between the faces of a 1-cm cube of water. It is generally measured in microSiemens per centimeter (µS/cm), which was previously called micromhos per centimeter (µmhos/cm), or milliSiemens per centimeter (mS/cm). Since specific conductance is temperature sensitive, it is commonly corrected to its equivalent value at 25°C for data comparison. Some equipment makes this conversion automatically, in which case these readings should be noted as "at 25°C." Otherwise, the water temperature at the time of the conductance reading should be recorded along with the conductance measurement so that the reading can later be corrected to 25°C.

4.7 *Turbidity* — Refers to inorganic solids, gas bubbles and organic matter suspended in water. Turbidity, in nephelometric turbidity units (NTU), is measured as the intensity of light scattered by the suspended particulates in a water sample relative to a standard reference suspension. The goal of well purging for water sampling is to minimize turbidity to a level as low as reasonably achievable.

4.8 *Volatile Organic Compounds (VOCs)* — A class of chemical compounds, predominantly hydrocarbons and halogenated hydrocarbons, with low molecular weights and low boiling points that are insoluble or slightly soluble in water.

4.9 *Well casing volume (bore volume)* — The volume of water standing in a well. One casing volume, in gallons, is computed as the measured length (ft) of the water column times the cross-sectional area (ft^2) of the well casing times the constant 7.48 gal/ft^3.

5.0 BACKGROUND AND PRECAUTIONS

5.1 This SOP shall be used in conjunction with an approved SSHASP. Also, consult the SSHASP for information on and use of all PPE.

5.2 Background

5.2.1 Groundwater that is stagnant in the well bore is subject to chemical reactions that may significantly alter the composition of the formation water. This stagnant water may no longer be representative of the groundwater surrounding the well.

5.2.2 Prior to collecting a representative ground water sample for laboratory analysis, ground water must be purged from the well according to the following guidelines:

- Under optimum conditions, three well casing volumes should be removed from the well (see section 8.2.6 for method of calculation) before sampling.
- Preferably, turbidity values prior to sampling should be less than 5 NTU. A value of less than 5 NTU is not always obtainable under some circumstances such as excess biogenicCO_2, poorly developed wells and invasive sampling techniques that agitate the water in the well casing (variable pumping rates and bailing). Under these circumstances a sample may still be collected. Be sure to record the final turbidity reading on the Water Quality Sampling Record (Attachment B).
- Specific conductance and pH readings should stabilize to within 10% variance of two or more consecutive readings.
- Occasionally select wells are developed in aquifers that have poor recharge characteristics due to low hydraulic conductivity, shallow hydraulic gradients or a combination of both. Removal of three well casing volumes under these conditions may not be possible due to time constraints, site accessibility, sample volume requirements and prohibitive costs. When these circumstances are encountered, purge a minimum of one well casing volume and sample after specific conductance and pH have stabilized to within 10% variance of two or more consecutive readings.
- The choice of equipment for well purging depends on the well yield, depth to groundwater, casing diameter, the required analysis, and the requirements in the appropriate work plan. The

decision to use any well-purging system should be based solely on what is appropriate for that particular situation.

5.3 Precautions

All waste generated from well development must be handled in accordance with LANL-ER-SOP-01.06.

6.0 RESPONSIBLE PERSONNEL

The following personnel are responsible for activities identified in this procedure.

6.1 ER Project Personnel

6.2 Field Team Leader

6.3 Quality Program Project Leader

6.4 Subcontractors

7.0 EQUIPMENT

A checklist of suggested equipment and supplies needed to implement this procedure is provided in Attachment A. Alphabetized descriptions of commonly used pieces of equipment, their advantages, and their limitations are listed below.

7.1 *Bailer* — A hollow tube or pipe fitted with a valve that is lowered into a well and retrieved to purge groundwater from a well.

7.1.1 Bailers may be constructed of stainless steel, polyethylene, or Teflon. When lowered into well, water enters the tube, the valve closes, and the filled bailer is retrieved with a rope or cable. Bailing purges the well casing and screen of standing water. Between bailing cycles, groundwater recovers in the well from the screen interval.

7.1.2 For shallow, small-diameter wells with low yields, well purging by the bailer method is feasible in the absence of a dedicated low-flow pump. Bailers are mechanically simple, lightweight and highly portable, constructed in many sizes, and require no external power source. Bailers are easily operated and cleaned and are inexpensive. In addition, considerable time and cost savings are possible by using dedicated bailers to reduce the decontamination task and to limit the possibility of cross-contamination (EPA, 1991).

7.1.3 The primary limitation of bailers is their limited-volume purging capability; especially in deep wells where purging is labor intensive and time consuming.

7.1.4 Bailers may disturb the water by the pressure changes created by purging.

7.1.5 Sampling personnel are directly exposed to any contaminants present.

7.1.6 Care must taken to prevent dropping or catching the bailer in the well, and care must be taken not to let the bailer line or bailer come in contact with the ground.

7.2 *Bladder pump* — A gas-driven submersible pump with an internal bladder that alternately inflates and collapses while forcing water through a plastic tube from the well to the surface.

7.2.1 The bladder pump assembly is suspended by the discharge tubing and submerged in the well near the lower part of the screen. Groundwater is transported through the discharge tube to the surface by positive gas displacement. A portable air compressor or bottled nitrogen is used to drive the pump.

7.2.2 Dedicated Teflon bladder pumps are recommended to minimize the introduction of contamination into the well. The maximum sample depth for a bladder pump is 400 ft. A bladder pump has an adjustable flow rate to allow purging at high rates and sampling at a low rate and causes very little agitation of the water.

7.3 *Reciprocating-piston submersible pump* — a gas-driven submersible pump that uses mechanical piston action to purge groundwater from a well.

7.3.1 The pump assembly is suspended by the discharge tubing and submerged in the well. Water is transported through the discharge tube to the surface by piston action. A portable air compressor is used to drive the pump.

7.3.2 The reciprocating piston submersible pump is a portable system that can purge wells where the depth to the water's surface is up to 500 ft. These pumps develop high pumping rates and can be operated in 2-in.-diameter wells. The pump is self-priming, and the compressed gas (air or nitrogen) that drives the pump does not contact the purged water. The pump is constructed from stainless steel or Teflon and can be decontaminated easily.

7.4 *Electric submersible pump* — An electric-motor-operated submersible pump that uses an internal rotating turbine to intake well water and force it to the surface.

7.4.1 The pump assembly is suspended by the discharge tubing and submerged in the well. The turbine in the pump bowl creates sufficient pressure to force water up the discharge pipe. Usually, a portable generator is required to power the electric pump (unless electricity is available) and a truck-mounted winch may be required to move and lower the pump into the well.

7.4.2 The submersible pump may be used for purging both shallow, small-diameter wells and deep, large-diameter wells that require large rates of discharge. Manufacturers offer small-diameter pumps constructed of stainless steel and Teflon that are capable of efficient purging at significant depths. The pump may be portable and self-contained.

7.4.3 Disadvantages of the submersible pump are that:

- the pump can be difficult to decontaminate and transport along with auxiliary equipment
- the pump motor may be damaged by dry pumping
- the gears may be damaged by water that contains high levels of suspended sediment
- large-capacity pumps are expensive
- with negative displacement, pumps can significantly aerate the sample, thus changing the in situ chemistry and stripping dissolved Volatile Organic Compounds (VOCs).
- Careful monitoring during operation is needed to obtain optimum pump performance and to preclude the possibility of equipment damage.

8.0 PROCEDURE

8.1 Use Current Procedure

ER Project personnel may produce paper copies of this procedure printed from the controlled-document electronic file located at LANL, Environmental Restoration Project. However, it is each person's responsibility to ensure that they trained to and utilize the current version of this procedure. The author may be contacted if text is unclear. The Document Control Coordinator (DCC) may be contacted if the author cannot be located.

8.2 Document Deviations

Deviations from SOPs shall be made in accordance with LANL-ER-QP-4.2, Standard Operating Procedure Development, and documented in accordance with LANL-ER-QP-5.7, Notebook Documentation for Environmental Restoration Techncial Activities.

8.3 Preliminary Activities

8.3.1 The **sampler or field team leader** shall obtain appropriate sampling paperwork and request for analysis.

8.3.2 The **sampler or field team leader** shall obtain appropriate sample containers, sample documentation (i.e., collection log and chain-of-custody forms, container labels, etc.) and sampling equipment.

8.3.3 The **sampler or field team leader** shall make provisions for proper storage and disposal of purged well water, as described in LANL-ER-SOP-01.06.

8.4 Pre-operation Field Activities – To be completed by Sampler or Field Team Leader.

8.4.1 Assemble the equipment and supplies listed in Attachment A.

8.4.2 Verify that the equipment and meters are in good working order.

8.4.3 Calibrate the meters with the appropriate calibration standards as specified in LANL-ER-SOP-06.02 or follow equipment operator's instruction manual. Meters shall be controlled in accordance with QP-5.2, Control and Measuring of Test Equipment.

8.4.4 In the field, locate the wells to be sampled.

8.4.5 Select appropriate staging and decontamination areas.

8.4.6 Prior to entering the first well to be sampled, decontaminate all equipment that will come into contact with the groundwater in accordance with LANL-ER-SOP-01.08, Field Decontamination of Drilling and Sampling Equipment. Routinely decontaminate all down-the-well equipment before entering any additional well. Use new rope for bailers, as necessary, for each well sampled.

8.4.7 Measure and record the depth to water in the well from a designated measuring point in accordance with LANL-ER-SOP-07.02. Also, measure the total depth (TD) of the well.

8.4.8 Determine the well casing volume as defined by the following relationship:

$$V = \frac{(d^2)\pi}{4}(h_2 - h_1) \times 7.48$$

Where: V = well casing volume, in gallons

π = 3.1416

d = well diameter, in feet

h_1 = depth to water, in feet

h_2 = well total depth, in feet

7.48 = gallons per cubic foot

Determine the height of the water column standing in the well by subtracting depth to water, in feet, from the total well depth. Measure the well diameter, in feet. Calculate the volume in gallons and enter these data on the Water Quality Sampling Record (Attachment B—form and completion instructions).

8.4.9 A minimum of three casing volumes should be purged before collecting a sample. If a sample must be collected before three casing volumes have been purged due to poor recharge, this activity will be documented in the field notebook and/or on the sample collection log.

8.5 Well Purging Operations- To be completed by Sampler or Field Team Leader.

8.5.1 If using a submersible pump, set the pump intake in the well at the approximate midpoint of the screened interval. Pump intake placement may differ according to site-specific goals.

8.5.2 Begin pumping water at a sustainable rate that will not induce drawdown in the well to an extent that air is sucked in at the intake.

8.5.3 Likewise, if a dedicated pump is being used, note the depth of the intake and ensure that the water level is not drawn below that level.

8.5.2 If using a bailer, lower the bailer to the bottom of the well, allow it to fill, and withdraw it. Discharge the water into a bucket, drum, or other appropriate container for temporary storage.

8.5.3 If possible, the water level should be monitored during purging to ensure that the water does not fall below the level of the pump intake.

8.5.4 Periodically record the discharge rate (usually by a bucket of known volume and stopwatch) and the time of day on the Water Quality Sampling Record (Attachment B). Also, calculate and tabulate the gallons discharged since the start of purging.

8.5.5 Periodically measure and record the water-quality parameters of the well fluid, as described in LANL-ER-SOP-06.02. Consult the appropriate work plan to determine which parameters to measure and the proper frequency of measurements. Field parameters should be measured at the start of purging and at least once per casing volume. Record the information on the Water Quality Sampling Record (Attachment B).

8.5.6 The well is ready to be sampled when (1) a minimum of three casing volumes of water has been purged (see 8.2.7) (2) field chemical parameters (e.g., pH and specific conductance) have stabilized, and (3) turbidity is stable or less than 5 NTU. Field parameters are considered stabilized when pH varies by less than 0.2 units or the variation in the other parameters over a series of four readings is within ten percent. If these parameters do not stabilize, a sample may still be collected and the records of the various parameters recorded so that analytical data may be placed in the proper context.

8.5.7 Record the final set of field parameters on the field parameter section of the Water Quality Stabilization Record (Attachment B in LANL-ER-SOP-06.02).

8.6 Water Sampling Operations- To be completed by Sampler or Field Team Leader.

8.6.1 Prepare to sample the well by organizing sample bottles, paperwork, and filtering apparatus, if appropriate.

8.6.2 Collect water samples in the order of priority as stated in the appropriate work plan or as otherwise directed. In general, collect the non-filtered samples in the order of most volatile to least volatile compounds.

8.6.3 Special precaution must be taken when collecting samples to be analyzed for VOCs. Volatile compounds will escape from the water to the air if any air is entrapped in the container. A VOC sample should be collected in a glass vial with a Teflon®-coated septum seal so that there are no bubbles in the container after the screw cap and septum seal are applied. Pre-preserve the vial with hydrochloric acid before collecting the sample. To ensure that air bubbles are not trapped in the vial, reduce the flow rate, fill the vial until a reverse meniscus forms above the top of the vial, and screw on the cap. Invert and tap the bottle to check for the presence of air bubbles. If air bubbles are present, the sample should be collected again.

8.6.4 Collect filtered samples using a 0.45 μm pore size filter. The filter may be a flat membrane supported by a filter-holder assembly or may be an in-line cartridge filter. If the filter-holder assembly and tubing is used, field personal must insure that it has been thoroughly cleaned and decontaminated. Filters coarser than 0.45 μm may be used to pre-filter however, the final filter size must be $\leq$ 0.45 μm. Flow a minimum of 100 ml of the sample through the filter and discard the filtered water before collecting a filtered sample for analysis. Follow LANL-ER-SOP-01.02 (Sample Containers and Preservation) when choosing the proper container and preservation technique for each analytical suite.

8.6.1 Occasionally it may be necessary to collect a sample in the field and filter at another location. Reasons include it may not be practical to use filtration apparatus at a remote site or the water sample is too turbid to filter at the time of collection. If the latter is the case, allow the suspension in the water sample to settle before filtering and preserving. An appropriate container must be used when collecting water to be filtered off-site. For example, water destined for metals and anions analysis should be collected in a polyethylene bottle or carboy; organics must be transported in a glass container. Do not use the same container that is used to transport the unfiltered water from the field as the final container that is shipped to the analytical laboratory. All containers must meet the minimum cleanliness specifications described in LANL-ER-SOP-01.02, which is, they must be pre-cleaned and certified by the vendor.

8.6.6 Fill out the sample collection logs, chain of custody, and label the sample containers.

8.6.7 Preserve the samples with the appropriate preservatives. Check the pH of each sample that is preserved with pH paper. See LANL-ER SOP-1.02 for sample preservation techniques.

8.6.8 After shutting down the pump, or bailing and sampling has been completed, measure and record the water-level drawdown in the well. The data will provide information about water recovery in the well for future sampling events.

8.7 Post-operation Activities- To be completed by Sampler or Field Team Leader.

8.7.1 After sampling, secure the well and well vault.

8.7.2 When sampling is completed, or at the end of the day, carefully clean the outside of the meters with a damp disposable towel to remove any visible dirt.

8.7.3 Decontaminate the pump assembly and other pieces of equipment that contacted the groundwater in accordance with LANL-ER-SOP-01.08.

8.7.4 Restore the well site to its original presampling condition. Secure the site when leaving.

8.7.5 Store the purged groundwater until proper diposal can be accomplished. Refer to LANL-ER-SOP-01.06, Management of Environmental Restoration Project Wastes.

9.0 REFERENCES

ER Project personnel using this procedure should become familiar with the contents of the following documents to properly implement this SOP, as applicable and appropriate.

Note: The Quality Management Plan, QPs and SOPs are located at http://erinternal.lanl.gov/home_links/Library_proc.shtml.

- LANL-ER-QP-2.2, Personnel Qrientation and Training
- LANL-ER-QP-3.2, Lessons Learned
- LANL-ER-QP-4.2, Standard Operating Procedure Development
- LANL-ER-QP-4.4, Record Transmittal to the Records Processing Facility
- LANL-ER-QP-5.2, Control of Measuring and Test Equipment
- LANL-ER-QP-5.7, Notebook Documentation for Environmental Restoration Technical Activities
- LANL-ER-SOP-01.04, Sample Control and Field Documentation
- LANL-ER-SOP-01.06, Management of Environmental Restoration Project Wastes
- LANL-ER-SOP-01.08, Field Decontamination of Drilling and Sampling Equipment
- LANL-ER-SOP-06.02, Field Analytical Measurements of Groundwater Samples
- LANL-ER-SOP-07.02, Fluid Level Measurements

10.0 LESSONS LEARNED

10.1 Prior to performing work, **ER Project personnel** should access the Department Energy lessons learned web page, located at Department Of Energy Lessons Learned and/or the Los Alamos National Laboratory lessons learned web page, located at Lessons Learned to find applicable lessons learns that may aid in the performance of their tasks.

10.2 During the performance of work, **ER Project personnel** shall identify, document and submit lessons learned, as appropriate in accordance with LANL-ER-QP-3.2, Lessons Learned, located at http://erinternal.lanl.gov/home_links/Library_proc.shtml.

11.0 RECORDS

The **FTL** is responsible for submitting the following records (processed in accordance with LANL-ER-QP-4.4, Record Transmittal to the Records Processing Facility) to the Records Processing Facility.

11.1 Daily Activity Log forms (Attachment E in LANL-ER-SOP-01.04, Sample Control and Field Documentation) or field notebook entries.

11.2 Water Quality Sampling Record (Attachment B)

11.3 Water Quality Stabilization Record (Attachment B in LANL-ER-SOP-06.02)

12.0 ATTACHMENTS

Attachment A: Equipment and Supplies Checklist for Purging and Sampling Methods for Single Completion Wells (1 page), located at http://erinternal.lanl.gov/Quality/user/forms.asp

Attachment B: Water Quality Sampling Record (form and completion instructions) (5 pages), located at http://erinternal.lanl.gov/Quality/user/forms.asp

Using a token card, click here to record "self-study" training to this procedure.

If you do not possess a token card or encounter problems, contact the RRES-ECR training specialist.

Equipment and Supplies Checklist for Purging and Sampling Methods for Single Completion Wells

- ☐ Purging pump or bailer
- ☐ Water level measurement device
- ☐ Calculator
- ☐ Thermometer
- ☐ Electrical conductivity (EC) meter (and extra cup)
- ☐ pH meter
- ☐ Turbidity meter
- ☐ Air compressor or bottled nitrogen (as needed)
- ☐ Standard reference solutions for calibrating specific conductance, pH, turbidity meters
- ☐ Portable generator, if needed
- ☐ 55-gallon drums or other water storage containers (as needed)
- ☐ Flow measuring equipment
- ☐ Plastic sheeting
- ☐ Buckets
- ☐ Stopwatch
- ☐ Daily Activity Log forms or Field Notebook
- ☐ Water Quality Stabilization Record forms
- ☐ Groundwater Elevation forms
- ☐ Variance log
- ☐ Any PPE listed or required in the SSHASP
- ☐ Any additional supplies listed in associated procedures, as needed
- ☐ Alkalinity kit
- ☐ ______________________________
- ☐ ______________________________

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Water Quality Sampling Record

Date/Time ______________________ Well I.D. ______________ Sheet 1 of ___

Technical Area ________ Focus Area ____________ Sample Identification ____________

Work Plan ____________________________

Field Team Member Signature ______________________________________
(Print name and title, then sign)

WATER SAMPLED:

☐ Groundwater; Well Number ____________ Sample Type ____________________

Sampling Period: Start __________ Complete __________

Sampling Methods/ Withdrawal Devices______________________________

Well CASING VOLUME CALCULATION*

$$\frac{d^2\pi}{4}(h_2 - h_1) \times 7.48$$

Depth of Well (h_2) (ft) ______________

Depth to Water (h_1) (ft) ______________

Well Diameter (d) (ft) ______________

One Bore Volume (gal.) ______________

Screened Interval (ft) ______________

Minimum Purge Volume (gal.) ______________

Total Volume Withdrawn (gal.) ______________

Instruments Used ______________

____

*Groundwater Only

SAMPLING INFORMATION

Filter Size ______________

Thermometer ID ______________

EC Meter ID ______________

pH Meter ID ______________

Pump ID ______________

Alkalinity Kit ID ______________

Preservation Methods and Comments See Sample Collection Logs for preservative used for each analysis. Samples are preserved in accordance with ER SOP 1.02.

Initial Groundwater Depth ____________ Sample Groundwater Depth ____________

PARAMETER MEASUREMENTS WHILE SAMPLING

Potential of Hydrogen-Ion Activity	pH	S.U.	______________
Specific Conductance	Ec	µs/cm	______________
Temperature	Temp	°C	______________
Alkalinity	ALK	mg/l $CaCO_3$	______________
Turbidity	Turb	NTU	______________

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Water Quality Sampling Record **(continued)**

Date/Time ____________________ Well I.D. __________________________________ Sheet 2 of __

Field Team Member Signature ____
(Print name and title, then sign)

SAMPLE TYPES	SAMPLING METHODS / WITHDRAWAL DEVICES
D – Duplicate T – Trip F – Field R – Replicate K – Known A – Acid Blank	B – Bailer C – Composite O – Other BP – Bladder Pump PP – Peristaltic Pump SL – Suction Lift Pump SP – Submersible Pump AL – Air Lift Sampler

CALIBRATION INFORMATION

Date/Time of EC Calibration ____________________________

Standard Solution ______ µs/cm, Instrument Reading ___________ Lot No. ____________ Exp. Date ________

Standard Solution ______ µs/cm, Instrument Reading ___________ Lot No. ____________ Exp. Date ________

Date/time of Turbidity Meter Calibration ____________________

Date/Time of pH Calibration ______________________________

Standard Solution ______ pH, Instrument Reading ___________ pH solution Lot No.__________ Date ________

Standard Solution ______ pH, Instrument Reading ___________ pH solution Lot No.__________ Date ________

SHIPPING INFORMATION

Date(s)Delivered to SMO: ____

Comments: ____

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Instructions for Completing a Water Quality Sampling Record

Use an indelible dark-ink pen. Make an entry in each blank. For entry blanks for which no data are obtained (except in Comments section), enter “UNK” for unknown, “N/A” for not applicable, or “ND” for not done, as appropriate. To change an entry, draw a single line through it, add the correct information above it, and date and initial the change. For all forms, complete the following information:

Header Information:

1. Date/Time—The date and time when the measurement was made, in the following formats: DD-MMM-YY (e.g., 01-JAN-91) and the 24-hr clock time (0837 for 8:37 a.m. and 1912 for 7:12 p.m.).
2. Well I.D. — List the number or designation of the sampled monitor well.
3. Sheet Number—Number all the sheets that are used for this activity, by day or by some practical unit.
4. Technical Area (TA)—Two-digit number that indicates the TA in which the activity is being performed.
5. Focus Area—Focus Area in which the activity is being performed.
6. Sample Identification—Follow ER-SOP-01.04, Sample Control and Field Documentation for sample identification.
7. Field Team Member Identification—Print your name and position title, then sign.

Water Sampled:

1. Indicate the identification number of the well being sampled.
2. Sample Types—One-character codes that distinguish the type of sample collected. This classification permits the analysis of data for specific groups of samples. The codes are identified at the top of the form’s second page.
3. Sample Period—The starting and ending times of sample collection.
4. Sampling Methods—Two-character codes that identify the method used to collect water samples. The codes are identified at the top of the form’s second page and defined in ER-SOP-06.01, Purging and Sampling Methods for Single Completion Wells.

Bore Volume Calculation (for groundwater sampling):

1. Depth of Well—Record depth in feet for groundwater sampling.
2. Depth to Water—Record depth in feet for groundwater sampling.

3. Well Diameter—Record diameter in feet for groundwater sampling.
4. One Bore Volume—Calculate volume in gallons using the equation on the form.
5. Screened Interval—Record interval in feet.
6. Minimum Purge Volume—Total volume of well water to be extracted. If possible, at least three bore volumes.
7. Total Volume Withdrawn—Record the total volume of water withdrawn.
8. Instruments Used—The types of instruments used to obtain measurements, monitor air quality, or facilitate the collection of a sample or test performance.

Sampling Information:

1. Withdrawal Devices—The sampling devices used to collect the samples.
2. Filter Size—Size of filter in use.
3. Thermometer ID—The identification of the thermometer used.
4. Conductivity Meter ID—The control number and manufacturer of the meter used to measure the specific conductance of samples or calibration solutions.
5. pH Meter ID—The control number and manufacturer of the meter used to measure the pH of the samples.
6. Pump ID—Identification of the pump in use.
7. Alkalinity Kit ID—Identification and model or serial number of the alkalinity kit used

Parameter Measurements (Recorded at the time the sample is collected.):

1. Potential of Hydrogen-Ion Activity (negative log base 10) —The pH value in standard units (S.U.).
2. Specific Conductance—The specific conductance of the water sample in micro-siemens per centimeter (µs/cm) at 25°C. Check your conductivity meter to determine what units (siemens or mhos) your meter records.
3. Temperature—The temperature of the water sample in degrees Celsius (°C).
4. Dissolved Oxygen—The dissolved oxygen content of the water sample in milligrams per liter (mg/l).
5. Turbidity—The turbidity of the water sample in nephelometric turbidity units (NTU).
6. Alkalinity — The alkalinity of the groundwater sample in mg/L.

Calibration Information:

1. Date/Time of EC Calibration—Date and time that the specific conductivity meter was last calibrated.

2. Standard Solution EC Readings—Record the standard specific conductances of the two solutions used and the readings when the probe was immersed. Include lot numbers and expiration dates of the standard solutions.
3. Date/Time of pH Calibration—Date and time that the pH meter was last calibrated.
4. Standard Solution pH Readings—Record the standard pH values of the two solutions used and the readings when the probe was immersed. Include lot numbers and expiration dates of the standard solutions.
5. Date/Time of Turbidity Meter Calibration — Record date and time when turbidity meter was last calibrated.

Shipping Information:

1. Include the date that samples were delivered to the SMO. If samples are taken or sent somewhere other than the SMO, record the appropriate information in the comments section.
2. Comments—This is a space for additional information about any entry on the form.